

*KRAMER  
V.C.*  
J. Clark Salyer National Wildlife Refuge, Dam 357  
Along the Lower Souris River  
Bottineau County  
McHenry County  
North Dakota

HAER No. ND-4-E

HAER  
ND,  
S-KRAM,  
I-E-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record  
Rocky Mountain Regional Office  
National Park Service  
U.S. Department of the Interior  
12795 W. Alameda Parkway  
Denver, Colorado 80225

HAER  
ND,  
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## HISTORIC AMERICAN ENGINEERING RECORD

### J. Clark Salyer National Wildlife Refuge, Dam 357

HAER No. ND-4-E

Location: Along the Lower Souris River, in the J. Clark Salyer National Wildlife Refuge,  
Bottineau and McHenry Counties, North Dakota

*KRAMER VIC.*

UTM: NE End: 48 degrees, 58' 59" (lat.); 100 degrees, 57' 34" (long.)

Center: 48 degrees, 59' 02" (lat.); 100 degrees, 57' 51" (long.)

SW End: 48 degrees, 59' 02" (lat.); 100 degrees, 58' 16" (long.)

Quad: Landa Quad

Date of Construction: 1935-1936

Present Owner: U.S. Fish and Wildlife Service

Present Use: Damming Souris River

Significance: The dams within the J. Clark Salyer National Wildlife Refuge represent a historical movement to preserve wildlife and wildlife habitat in the United States, which began in the mid-19th century and continues today. The refuge dams are significant for their association with the development of the national wildlife refuge system during the New Deal Era. At the time of its creation, the J. Clark Salyer Wildlife Refuge was considered the most important project in the Federal Government's program of migratory waterfowl habitat restoration. The dams also are representative examples of dams designed by the Federal Government during the New Deal Era for conservation projects.

Historians: Frederick L. Quivik, RTI, Inc., August 1989  
Mary E. McCormick, RTI, Inc., August 1989  
Jane L. Carroll, St. Paul District Corps of Engineers, March 1990

For more historical information, see J. Clark Salyer National Wildlife Refuge Dams, HAER No. ND-4

## **J. CLARK SALYER NATIONAL WILDLIFE REFUGE DAMS (Lower Souris National Wildlife Refuge)**

The J. Clark Salyer National Wildlife Refuge is located along a winding 75-mile stretch of the Souris River in Bottineau and McHenry counties in north-central North Dakota. Originally established in the mid-1930s as the Lower Souris National Wildlife Refuge, this refuge was renamed in 1967 in honor of J. Clark Salyer, II, the chief of the national wildlife refuge program from 1934-1961. The 58,700-acre refuge is largely comprised of native prairie lands, with some wooded bottom lands and aspen and brush-covered sandhills, as well as over 21,000 acres of restored river ponds, marshes, and wet meadows. Water developments in the refuge were established and are maintained by a network of five major dams and other diversion structures, including two small masonry dams and several dikes, levees and channels. The five major dams are located so that their reservoirs or backwaters extend nearly the entire length of the refuge, from near Upham north to the United States-Canada border. The headquarters for the refuge are situated west of the river, about two miles north-northeast of the town of Upham, and adjacent to one of the southernmost dams, Dam 326. Access to the refuge headquarters from Upham is provided by a county highway.

### **DAM 357**

Dam 357 is the farthest north, or downstream, of the five dams at the J. Clark Salyer Refuge. It is located in Bottineau County, about one mile south of the United States-Canadian border and nearly 25 miles northwest or downstream of the refuge headquarters (S 1/2 Sec. 31, T164N, R79W). Built after the refuge was enlarged to the north, Dam 357 is the last of the five major dams on the refuge to be constructed.

Dam 357 consists of a homogeneous earthfill embankment, an emergency spillway, and outlet works. The crest length of the entire structure is about 3,070 feet. The west half of the dam is oriented along an east/west axis, while the east section of the structure lies on a southeast/northwest axis. During construction of the dam, fill for the embankment was hauled to the site by truck and apparently consisted mostly of gravel. [1] In the late 1940s, flood water topped the embankment and, in 1951, three additional feet of earthfill was laid along the crest. [2] The crest of the embankment currently is 12 feet wide, 16 feet high, and at an elevation of 1418.6 feet. The upstream face of the embankment has a slope of 5:1 and is covered by river cobbles. The downstream slope is 4:1 and is vegetated with grass.

The emergency spillway is located at the east end of the dam and lies along the crest of the embankment. The spillway is a 700-foot-long weir wall with a two-bay log structure located near its midpoint. When it was originally constructed, the weir wall was of stone-masonry construction with stone-masonry wing walls, and a stone-masonry apron and riprap below the wall's downstream edge. In the late 1940s, the stone-masonry wall was modified by the addition of a concrete cap and concrete buttresses spaced 12 feet on center along its downstream face. [3] Two of the concrete buttresses are inscribed. One bears the phrase "dedicated to a duck" and another the name "C. J. Henry." C. J. Henry was a junior biologist at the refuge when work on the project first began in 1935-36 and, by 1939, he was the refuge manager.

The main outlet works for the dam span the main river channel about 900 feet west-northwest of the right abutment. It consists of a reinforced concrete structure with three radial gates. The concrete structure is comprised of four 18-foot-long by 16-foot-high walls (two end walls and two piers) that serve to support the radial gates. The downstream wing walls of the concrete structure are constructed of interlocking, corrugated sheet piling. The upstream wing walls are concrete.

The radial gates each consist of a corrugated steel face (16 feet wide by 10 feet high) with channel-section supports and angle-section radials. The outer face of each gate is set along the upstream side of the concrete structure. There is no intake to the gates; however, the concrete walls between the gates extend downstream and serve as outlet structures. Manual hoists operate the radial gates. The hoist control for each gate is mounted on top of an adjacent concrete wall. A cantilevered walkway along the concrete structure's upstream edge provides access to the hoist controls. Angle-section knee braces secure the walkway to the structure. The walkway consists of a plank deck with angle-section railing. Along its downstream side, the concrete structure also supports a concrete beam walkway protected by angle-section railing. In 1951, the original height of the concrete structure was raised 3 feet by concrete caps that were added to the top of each of the end walls and piers, as well as to both of the upstream wing walls. At the same time, the gate hoist controls and the upstream and downstream walkways were removed and reinstalled in their current locations. [4]

Soon after the dam was constructed, a low level outlet was installed, consisting of a 36-inch diameter concrete pipe. Located near the left abutment, the pipe extends through the embankment and at its upstream opening has a concrete bulkhead with a slide gate control. [5] The pipe was apparently plugged several years ago. [6] In the mid-1960s, another flow outlet was constructed to the west of the main outlet works. This modern structure was designed to control release flows to Canada, as mandated by international treaty and consists of a concrete bulkhead with slide gates and two conduits. [7] The concrete bulkhead is located on the upstream side of the embankment and is flanked by retaining walls that extend upstream and serve as an intake. The top of the bulkhead is open, but protected by steel grating. The bulkhead structure is 8 feet wide, 7 feet long and is divided into two chambers by an 8-inch-thick concrete wall. At the upstream end of each chamber is an "orifice" slide gate (30 inches wide and 24 inches high), while at the downstream end of each chamber is a "turnout" slide gate (24 inches in diameter). Each gate is set in 4-foot frames with noon-projecting stems. The "turnout" slide gates each open into a concrete pipe (24 inches in diameter). Both of the pipes extend through the embankment and discharge on the downstream side of the dam.

#### FOOTNOTES

- 1 Fox and Clayton, "Inspection report, Dam 357," p. 11.
- 2 Ibid.
- 3 John F. Reiger, *American Sportsmen and the Origins of Conservation*. Norman: University of Oklahoma Press, 1975, p. 21
- 4 Ibid., p. 51.
- 5 U.S. Department of Agriculture, Bureau of Biological Survey, drawing M-N. DAK: 3-24, "Lower Souris Exten.: Pipe and Gate Outlet Control at Dam No. 357," included as attachment C-10 to Fox and Clayton, "Inspection Report: Dam 357."
- 6 Fox and Clayton, "Inspection Report: Dam 357," p. 10.
- 7 Ibid., p. 10, and attachment C-14, U.S. Department of the Interior, Fish and Wildlife Service, Drawing No. R-NO DAK-165-54, "Lower Souris: Water Control Structure Plan and Elevation," December 1965, revised October 1966.

NOTE: See also J. Clark Salyer National Wildlife Refuge Dams, HAER No. ND-4.